

Motivation for Shape Grammars in Architecture

- Architect's have long realized that certain formulas apply to parts of buildings.
- Will give some examples here illustrating this idea

Doors

Stairs

Parameterizable Architectural Details

Doors

- Dietz

Commonly 1 1/8", 1 3/8", 1 3/4" thick

Stock doors (interior): 1 1/8": upto 34" wide and 6'10" high

Stock doors made in 2" increments of width and height

- From web:

Standard Exterior Sizes: 32" x 80" x 1-3/4", 34" x 80" x 1-3/4",
36" x 80" x 1-3/4"

Parameterizable Architectural Details

Stairs

Vitruvius:

The rise of such steps should, I think, be limited to not more than **ten nor less than nine inches**; for then the ascent will not be difficult. The treads of the steps ought to be made not less than a **foot and a half, and not more than two feet deep**.

Alberti:

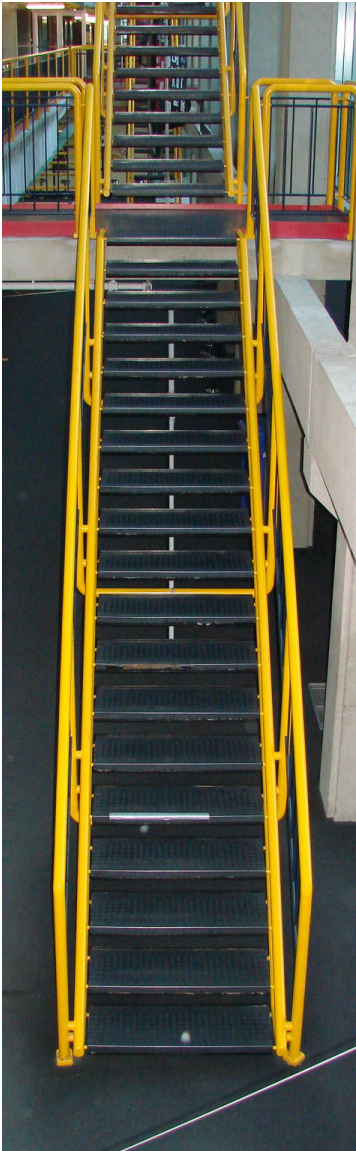
The steps they never made higher than nine Inches, nor lower than six, and in Breadth never less than a Foot and a half, nor more than a Yard.

Modern Stairs

Dietz:

- Risers over 8" high are too steep for comfort
- Those less than 6" are too slow in their ascent
- Best practice: slightly over 7"
- Maintain certain proportions between rise and run
 - rise times run equals 70 to 75
 - rise plus run equals 17 to 17.5
 - (twice rise plus run equals 24 to 25)

Example 1: DC



7.5" rise, 12" run (10")

rise times run 75

rise plus run 17.5 [25]

slope 0.75 (37 degrees)

Feel: fine

Example 2: DC Fire exit



7.5" rise, 10" run
rise times run 75
rise plus run 17.5 [25]
slope 0.75 (37 degrees)

Feel: fine

Example 3: Needles Hall



6.5" rise, 11.5" run
rise times run 74.7
rise plus run 18 [24.5]
slope 0.57 (30 degrees)

Feel: uncomfortable going
down

Example 4: Home



7.75" rise, 9–13" run
rise times run 69.75–100.75
rise plus run 16.75–20.75
slope 0.86–0.60 (41–31 degrees)

Feel: fine

Example 5: Basement



8.5" rise, 9" run
rise times run 76.5
rise plus run 17.5 [26]
slope 0.94 (43 degrees)

Feel: fine

Example 6: Garage



8" rise, 9 1/4" run
rise times run 74
rise plus run 17 1/4 [25.25]
slope 0.86 (41 degrees)

Feel: fine

Example 7: Outside Dana Porter



rise 5" , run 18"

rise times run 90

rise plus run 23 [28]

slope 0.28 (15 degrees)

Feel: awkward up, comfortable down

Example 8: Amsterdam Canal House



rise 8.85" [7 2/3"], run 9" (6")

rise times run 53

rise plus run 14.85 [23.7]

slope 1.5 (56 degrees)

Feel:



House built in 15th century;
stairs likely from 17th century;
curve allows larger steps, less
slope

For next week

- Skim Vitruvius, Dietz, Alberti, Tzonis-Lefaivre, Cole

Vitruvius Book III, Chapters 3,4,5

Look for parameters

- Select paper, date

- Measure Stairs

At least two (one “standard”, one less so)

Pictures

Email me: pdf or URL (pictures, measurements, feel)